False-Positive Subtraction Scintigram of the Parathyroid Glands Due to Metastatic Tumor

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A focus of increased uptake on a ^{201}Tl minus ^{99m}Tc subtraction scintigram of the parathyroid glands was found in a patient with persistent hypercalcemia. This area was not caused by an abnormal parathyroid gland but by an enlarged lymph node containing metastatic tissue from an adenocarcinoma of the ovary.

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Recently a subtraction imaging method [thallium-201 (^{201}Tl) minus technetium-99m (^{99m}Tc)] has been described for locating abnormal parathyroid glands (*1*,*2*). This method proved to be highly successful in locating parathyroid adenomas larger than 5 mm in diam, but was less reliable in locating four-gland hyperplasia. We present a patient with persistent hypercalcemia and a focus of increased uptake on a substraction scintigram. This area was caused by an enlarged lymph node containing a metastasis from an adenocarcinoma of the ovary.

METHODS

First, 20 min after i.v. injection of 5 mCi (185 MBq) ^{99m}Tc as pertechnetate, an image of the thyroid is obtained with a gamma camera, with parallel-hole collimator, peaked on the 140-keV photopeak of technetium-99m. The image is stored in computer in ×2 zoom magnification. Thereafter, without changing the position of the patient, 2 mCi (74 MBq) ^{201}Tl (thallous chloride) is injected i.v., and 10 min later another image is obtained with the camera peaked on the 69–80 keV x-rays of the ^{201}Hg daughter. This image is also stored in zoom mode. The ^{99m}Tc image is then subtracted from the ^{201}Tl image, leaving a residual parathyroid image. A focal intra- or extrathyroidal uptake of ^{201}Tl above the background is considered abnormal.

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CASE REPORT

A 52-yr-old woman was admitted because of persistent hypercalcemia, polyuria, thirst, and fatigue. One year earlier, an adenocarcinoma of the left ovary with malignant ascites was diagnosed (Stage Ic). The tumor was removed and combination chemotherapy was administered. Clinically she went into a complete remission. Physical examination at the present admission showed no abnormalities. Laboratory examinations revealed a serum calcium of 3.82 mmol/l (normal range 2.25–2.75), phosphate 0.59 mmol/l (0.8–1.4), parathormone N-terminal fragment 0.27 μgEq/l (0.02–0.30) and normal values for 25-(OH) vitamin D, 24,25-(OH) vitamin D, 1,25-(OH) vitamin D, and alkaline phosphatase. The differential diagnosis included primary hyperparathyroidism and ectopic hyperparathyroidism because of recurrent malignant disease. A subtraction scintigram of the thyroid and parathyroid region showed an area of increased uptake low in the right lobe of the thyroid (Fig. 1). Ultrasonography proved this lesion to be solid and located behind the thyroid (Fig. 2). Surgical exploration of the neck was performed. Two small parathyroids, located near the lower poles of right and left thyroid lobes, were removed, but appeared normal on microscopic examination.

At the site of the scintigraphic focus of increased activity a solid tumor ~2 cm in diam was found. It proved to be a lymph node containing adenocarcinoma identical to the adenocarcinoma of the ovary that was treated a year before.

DISCUSSION

A recent study showed this imaging method to be the most efficient noninvasive technique in locating parathyroid adenomas. However false-positive images do occur. Young et al. describe false-positives caused by a thyroid adenoma and an enlarged lymph node invaded by sarçoidosis (*1*). Furthermore, thallium-201 uptake

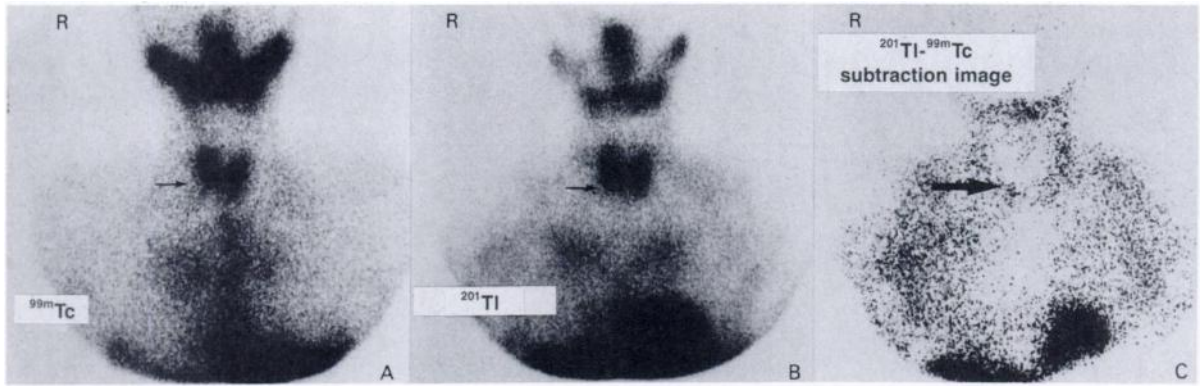

FIGURE 1
Thallium-technetium subtraction scintigrams of parathyroid region. A: ^{99m}Tc image. Small defect is seen in lower lateral part of right thyroidal lobe (small arrow). B: ^{201}Tl image. Defect seen in A fills in (small arrow). C: Computer-generated subtraction image, B-A. At bottom of right thyroidal lobe is area of increased uptake of ^{201}Tl (large arrow)

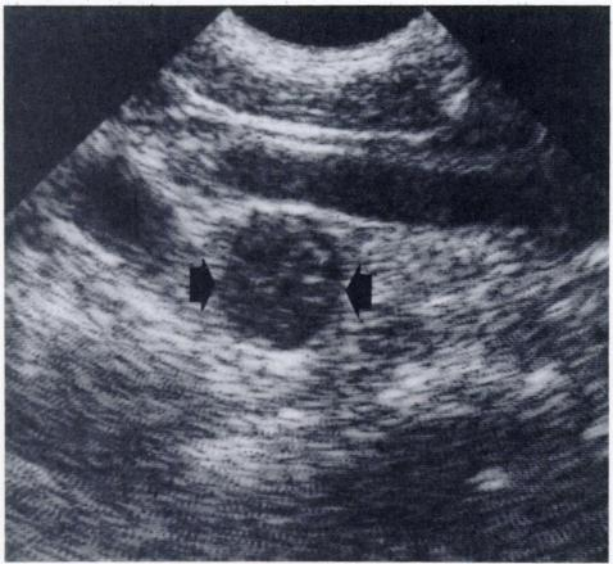

FIGURE 2
Ultrasonogram region of increased ^{201}Tl uptake, longitudinal slice. Behind right carotid artery round, well-demarcated homogeneous structure is seen, with less reflection than surrounding tissue (arrows); diam 16 mm

in thyroid carcinoma and its lymph-node metastases has been reported (*3*,*4*). The parathyroid glands of this patient were explored but showed no abnormalities at inspection. We therefore conclude that the differential diagnosis of a focus of increased activity on a ^{201}Tl/^{99m}Tc subtraction image of the neck should include a lymph-node metastasis of nonthyroidal origin.

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